

# **CENTENNIAL PLANT COLLECTION: REVISITING 1904 HERBARIUM SPECIMENS FROM THE SAN JUAN ISLANDS IN 2004**

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## **ABSTRACT**

For the occasion of the 100<sup>th</sup> anniversary of the University of Washington Friday Harbor Laboratories, we revisited a collection of University of Washington Herbarium specimens from the first summer of classes in the San Juan Islands in 1904. These constitute the earliest plant specimens from the San Juans presently in the UW Herbarium. Less than half of this herbarium collection is digitized online, but having discovered this unique database, we decided to see how many of the species could still be located at or near where they were collected 100 years ago. Searching the specimen labels that are available online, we found 42 species collected in San Juan County June to August 1904. Additional un-digitized 1904 specimens probably exist in the UW Herbarium collection. As many of the original sites as possible were revisited one hundred years later. Specimens were originally collected on seven islands (San Juan, Orcas, Stuart, Blakely, Wasp, Flat Top and John's). We recollected 13 of the 42 species, most of which were present very near where they had been found in 1904. Some of the missing species have long been extirpated from the San Juans; a few others were in locations not accessible to us.

## **INTRODUCTION**

In 2004, one of us (VW-E) realized that there was a 100 year database of plant collecting in San Juan County archived at the University of Washington's herbarium. Herbarium collections are important databases for botanists. They can be used to conduct ecogeographical studies (Dulloo *et al.*, 1999; Smith and Peralta, 2002), and to identify conservation priorities by mixing historical herbarium records and present day field surveys (MacDougall *et al.*, 1998; Hedenäs *et al.*, 2002; Joye *et al.*, 2002; Lienert *et al.*, 2002). By using the specimens available to us, we conducted a revisitation study on herbarium specimens collected exactly 100 years ago (that is, in 1904).

## **METHODS**

The University of Washington's herbarium (WTU) has begun creating an online database of the herbarium specimens in their collection by digitizing the specimen labels. This database is searchable by using the links available on the herbarium's website. Using this database, we searched for specimens collected in the San Juan Islands (San Juan County) of Washington State in the year 1904. We isolated all the 1904 specimens that had been entered into the database. After identifying these specimens, we placed the species on a calendar in chronological order. Then, we revisited each site to collect a current specimen on or as close to the original date as possible. Collected specimens were pressed and mounted on herbarium sheets per standard protocol described in Balick and Cox (1996) and will be donated to WTU and the herbarium at the Friday Harbor Labs.

## **RESULTS**

We were able to locate a total of 42 specimens collected in 1904 by using the electronic database at WTU (see Table 1). Because only about 25,000 of WTU's 375,000 vascular plant holdings have been digitized, there may well be

more specimens from 1904, but it would be impractical to try to locate them before they are digitized. All of these 1904 specimens were collected between the months of June and August, and were collected on seven different islands in the San Juan archipelago. These islands were San Juan, Orcas, Stuart, Blakely, Wasp, Flat Top and John's. We were able to recollect 13 species on the original island, on or around the original date (see Table 2).

**Table 1. List of WTU herbarium specimens collected in 1904.**

Species	Accession #	Location	Date	Collector
<i>Adiantum pedatum</i>	34958	Newhall, Orcas	28 June	A.S. Pope
<i>Agrostemma githago</i>	6980	Friday Harbor, San Juan	26 June	A.S. Pope
<i>Antennaria racemosa</i>	17344	Mt. Constitution, Orcas	8 July	T.C. Frye
<i>Arenaria macrophylla</i>	94928	Stuart Island	26 June	W.H. Lawrence
<i>Arenaria tenella</i>	96246	John's Island	30 June	W.H. Lawrence
<i>Armeria maritima</i>	14010	Trout Lake, San Juan	14 July	A.S. Pope
<i>Artemisia campestris</i>	17400	Wasp Island	25 June	A.S. Foster
<i>Athyrium distentifolium</i>	2091	NO LOCALITY GIVEN	8 August	A.S. Pope
<i>Carex obnupta</i>	96206	Stuart Island	20 June	W.H. Lawrence
<i>Claytonia perfoliata</i>	96255	Stuart Island	26 June	W.H. Lawrence
<i>Clematis vitalba</i>	8141	Roche Harbor, San Juan	11 July	A.S. Pope
<i>Corallorhiza striata</i>	5342	Friday Harbor, San Juan	15 June	A.S. Foster
<i>Cornus stolonifera</i>	94931	Stuart Island	27 June	W.H. Lawrence
<i>Cornus unalaschensis</i>	13286	Mt. Constitution, Orcas	8 July	A.S. Foster
<i>Dicentra formosa</i>	8686	Trout Lake, San Juan	14 July	A.S. Pope
<i>Dryopteris austriaca</i>	124829	Friday Harbor, San Juan	7 July	J.B. Flett
<i>Galium cymosum</i>	96280	Stuart Island	20 July	W.H. Lawrence
<i>Habenaria orbiculata</i>	5339	Friday Harbor, San Juan	July	A.S. Foster
<i>Lilium columbianum</i>	94934	Flat Top Island	22 June	W.H. Lawrence
<i>Listera caurina</i>	347332	Friday Harbor, San Juan	July	A.S. Foster
<i>Marah oreganus</i>	94935	Stuart Island	26 June	W.H. Lawrence
<i>Mimulus moschatus</i>	15639	Trout Lake, San Juan	14 July	A.S. Pope
<i>Orthocarpus bracteosus</i>	15696	NO LOCALITY GIVEN	22 July	A.S. Pope
<i>Philadelphus lewisii</i>	96198	Stuart Island	26 June	W.H. Lawrence
<i>Picea sitchensis</i>	25347	Blakely Island (NE end)	24 August	T.C. Frye
<i>Populus tremuloides</i>	24078	Stuart Island	12 June	A.S. Pope
<i>Prunella vulgaris</i>	15140	Friday Harbor, San Juan	20 July	A.S. Pope
<i>Pterospora andromedea</i>	33268	Friday Harbor, San Juan	July	A.S. Foster
<i>Pyrola asarifolia</i>	13409	NE San Juan Island	15 July	A.S. Pope
<i>Pyrola chlorantha</i>	13405	NE San Juan Island	15 July	A.S. Pope
<i>Rumex fenestratus</i>	6518	Kanaka Bay, San Juan	30 June	A.S. Pope
<i>Schoenoplectus pungens</i>	96205	Stuart Island	18 June	W.H. Lawrence
<i>Sedum lanceolatum</i>	8687	Friday Harbor, San Juan	25 June	A.S. Pope
<i>Senecio vulgaris</i>	96200	Stuart Island	27 June	W.H. Lawrence
<i>Sidalcea hendersonii</i>	12022	Trout Lake, San Juan	14 July	A.S. Pope
<i>Spergularia marina</i>	96263	John's Island	30 June	W.H. Lawrence
<i>Stellaria crispa</i>	96264	Stuart Island	26 June	W.H. Lawrence
<i>Thuja plicata</i>	2671	Friday Harbor, San Juan	30 June	A.S. Pope
<i>Trifolium fimbriatum</i>	96212	Stuart Island	20 June	W.H. Lawrence
<i>Tsuga heterophylla</i>	2669	Friday Harbor, San Juan	25 July	A.S. Pope
<i>Urtica dioica</i>	94936	Stuart Island	25 June	W.H. Lawrence
<i>Veronica peregrina</i>	96204	Stuart Island	20 June	W.H. Lawrence

**Table 2. List of species re-collected in 2004**

Species	Location	Date	Collector
<i>Athyrium distentifolium</i>	Friday Harbor, San Juan	7 July	C.E. Mills
<i>Carex opnupta</i>	Stuart Island	10 June	C.E. Mills
<i>Clematis vitalba</i> (seed clusters)	Roche Harbor, San Juan	13 July (10 Sept.)	V.R. Wyllie-Echeverria & C.E. Mills
<i>Corallorhiza striata</i>	Friday Harbor, San Juan	27 June	C.E. Mills
<i>Cornus stolonifera</i>	Stuart Island	25 June	V.R. Wyllie-Echeverria & C.E. Mills
<i>Dryopteris austriaca</i>	Friday Harbor, San Juan	7 July	C.E. Mills
<i>Listera caurina</i>	Friday Harbor, San Juan	25 June	C.E. Mills
<i>Marah oreganos</i>	Stuart Island	10 June	C.E. Mills
<i>Picea stichensis</i>	Blakeley Island	1 October	V.R. Wyllie-Echeverria
<i>Populus tremuloides</i>	Stuart Island	10 June	C.E. Mills
<i>Thuja plicata</i>	Friday Harbor, San Juan	30 June	C.E. Mills
<i>Tsuga heterophylla</i>	Friday Harbor, San Juan	30 June	C.E. Mills
<i>Urtica dioica</i>	Stuart Island	25 June	V.R. Wyllie-Echeverria & C.E. Mills

## DISCUSSION AND CONCLUSIONS

There were several reasons why we were not able to revisit and recollect some of the 1904 specimens. Some locations were not available to us because of ownership or protected status, and sometimes we could not find the species listed. When this was the case, we tried to gather another species in the same genus. Even though we failed to locate some species at the locations described, it does not mean that they are not still there. The locations should be searched again before the species are listed as being extirpated at that site. On the other hand, we were able to collect several more species than those 13, but some were not collected on the right island. Even though we don't know if they are still present at the original collection site, we know that they are still extant in San Juan County.

One interesting feature we noticed was a difference in the flowering times of some species. It may have been only inter-annual variability, but we found that several orchids were flowering about a month earlier in 2004 versus 1904. It has been shown that morphological feature changes can be documented by looking at herbarium specimens placed in a chronological order (Beerling and Chaloner, 1993a; Beerling and Chaloner, 1993b; Jacobs, 1999; McGraw, 2001). Another species of interest is *Clematis vitalba*, which is an invasive species at numerous sites in the San Juan Islands. The fact that it was collected in 1904 shows that it must have been introduced soon after the islands were settled by non-native peoples.

In conclusion, we have shown the importance of using existing herbarium records to inventory plant species of certain local areas and to use this data in conjunction with field surveys to learn whether the species are still extant, and if not, to try and figure out why. This could hold important consequences for land management practices (MacDougall *et al.*, 1998; Lienert *et al.*, 2002), and how to preserve areas that are scheduled for development if they support rare flora.

**Figure 1. 1904 and 2004 specimens of (top to bottom) *Clematis vitalba*, *Cornus stolonifera* and *Populus tremuloides*.**



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## REFERENCES

- Balick, N. J. and P. A. Cox, 1996, *Plants, People and Culture: The Science of Ethnobotany*, Scientific American Library, New York, 228 pp.
- Beerling, D. J. and W. G. Chaloner, 1993a, The impact of atmospheric CO<sub>2</sub> and temperature change on stomatal density: observations from *Quercus robur* lammas leaves, *Annals of Botany*, 71: 231-235.
- Beerling, D. J. and W. G. Chaloner, 1993b, Evolutionary responses of stomatal density to global CO<sub>2</sub> change, *Biological Journal of the Linnean Society*, 48: 343-353.
- Dulloo, M. E., N. Maxted, L. Guarino, D. Florens, H. J. Newbury and B. V. Ford Lloyd, 1999, Ecogeographic survey of the genus *Coffea* in the Mascarene Islands, *Botanical Journal of the Linnean Society*, 131: 263-284.
- Hedenäs, L., I. Bisang, A. Tehlar, M. Hamnede, K. Jaederfelt and G. Odelvik, 2002, A herbarium based method for estimates of temporal frequency changes: mosses in Sweden, *Biological Conservation*, 105: 321-331.
- Jacobs, B. F., 1999, Estimation of rainfall variables from leaf characters in tropical Africa, *Palaeogeography, Palaeoclimatology, Palaeoecology*, 145: 231-250.
- Joye, D. A., E. Castella and J.-B. Lachavanne, 2002, Occurrence of Characeae in Switzerland over the last two centuries (1800-2000), *Aquatic Botany*, 72: 369-385.
- Lienert, J, M. Fischer and M. Diemer, 2002, Local extinctions of the wetland specialist *Swertia perennis* L. (Gentianeaceae) in Switzerland: a revisitation study based on herbarium records, *Biological Conservation*, 103: 65-76.
- MacDougall, A. S., J. A. Loo, S. R. Clayden, J. G. Goltz and H. R. Hinds, 1998, Defining conservation priorities for plant taxa in southeastern New Brunswick, Canada using herbarium records, *Biological Conservation*, 86: 325-338.
- McGraw, J. B., 2001, Evidence for decline in stature of American ginseng plants from herbarium specimens, *Biological Conservation*, 98: 25-32.
- Smith, S. D. and I. E. Peralta, 2002, Ecogeographic surveys as tools for analyzing potential reproductive isolating mechanisms: an example using *Solanum junlandifolium* Dunal, *S. ochranthum* Dunal, *S. lycopersicoides* Dunal and *S. sitiens* I. M. Johnston, *Taxon*, 51: 341-349.
- University of Washington Herbarium (WTU stands for Washington Territorial University).